CS63 Fall 2020
Lab 6: Convolutional Neural Networks

Devyani Mahajan, Cisco Velasco

1 Data Set

The fashion MNIST dataset consists of 10,000 items. It is comprised of images of clothing; these images correspond to one of ten classes. As such, any given image could either be a t-shirt, trousers, pullover, dress, coat, sandals, shirt, sneakers, bag, or ankle boots. Each image is in the format of a 28x28 gray-scale image. The dataset itself consists of 785 columns, with the first column containing the class values, and the others containing the pixel values.

2 Network

Our best performing network produced a validation accuracy of averaging at 93followed by a pooling layer, and a dropout layer. We then had a flattening layer and a hidden layer, followed by outputs. The first set of conv layers had 32 3x3 filters, and the second set had 64 3x3 filters. When we compiled, we optimized with the Adam algorithm.

After trialing multiple variations of the network, we realized that 25 epochs often produced the highest validation accuracy, while also minimizing loss. We further experimented with ways of improving our accuracy by adding a dropout layer, which we found to be effective, as well as changing our optimizer to the Adam algorithm. Each of these steps sequentially increased our accuracy. We also found that a larger number of filters was beneficial in increasing accuracy and thus improving performance. Prior to adding the dropout layer and changing optimizers, we had an accuracy of around 90validation accuracy and improving our overall performance, though we noticed that our losses increased as well.

3 Training

run number	run 1	run 2	run 3	run 4	run 5	average
val loss	0.2514	0.2560	0.3014	0.2662	0.2715	0.2693
val accuracy	0.9309	0.9319	0.9267	0.9307	0.9318	0.9304

4 Evaluation

Our network was good at labeling shirts and dresses. They have very distinctive shapes and their differences are simple in that they vary in terms of length, so they are among the easiest items to label and distinguish from one another, unlike distinguishing between a high-top sneaker and

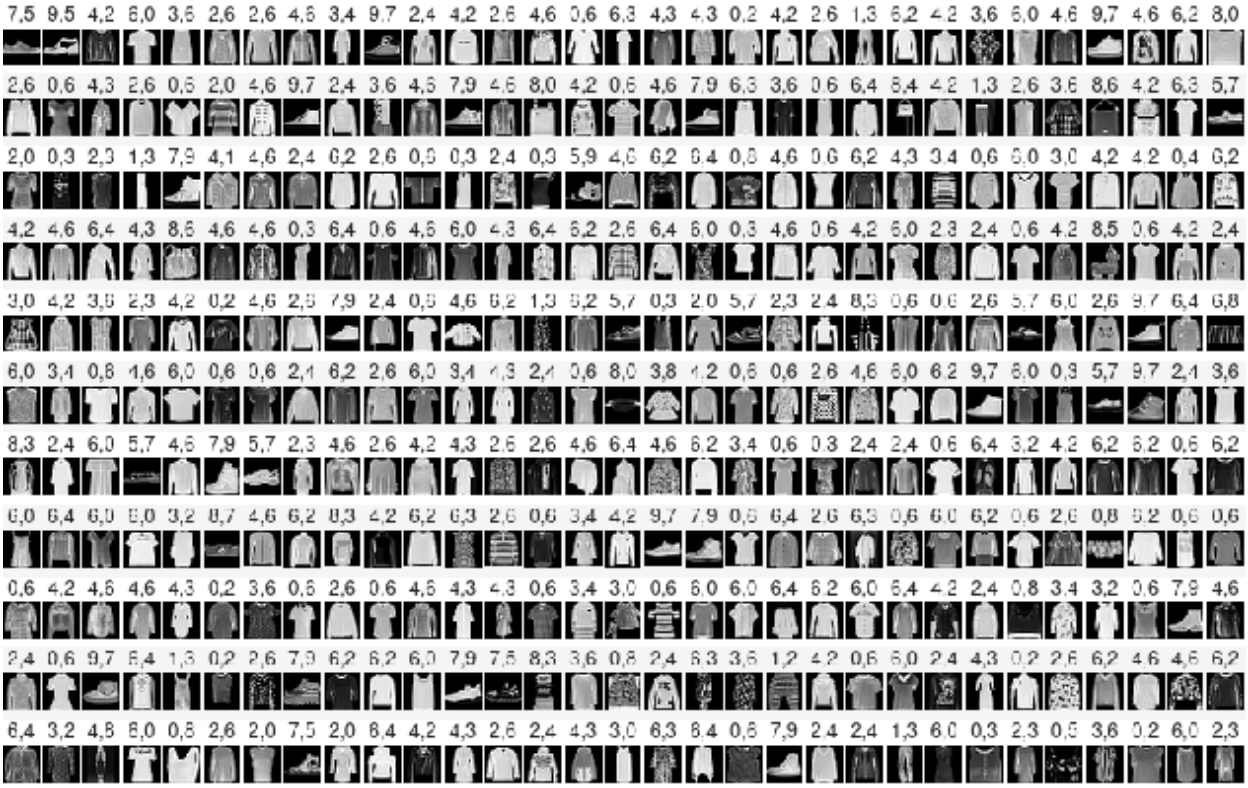

Figure 1: Summary

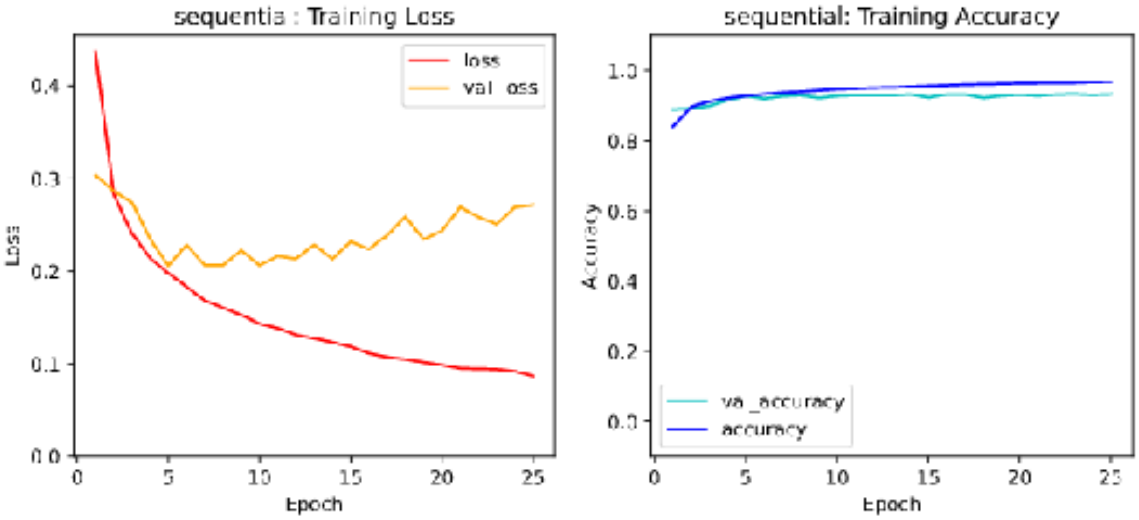

Figure 2: training graph

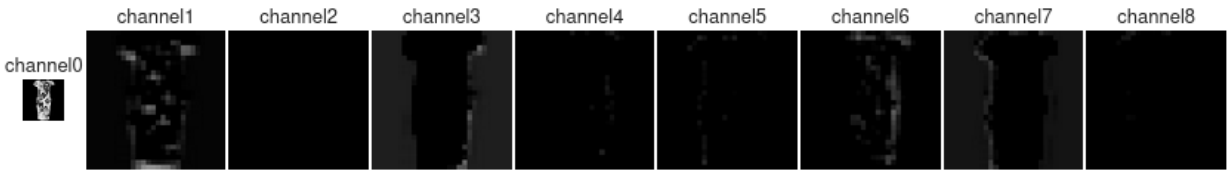

Figure 3: Feature Map

an ankle boot. Our network was worst at labeling sneakers. This is likely because the images of sneakers include different orientations, with the shoes facing both left and right, while other clothing items have more standardized orientations and presentations. In this way, it is difficult to generalize the image of a sneaker with our neural network, as it presents a different challenge from the other items of clothing we analyzed.